

RULE 358
POLYSTYRENE FOAM OPERATIONS
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**MARICOPA COUNTY
AIR POLLUTION CONTROL REGULATIONS
REGULATION III - CONTROL OF AIR CONTAMINANTS
RULE 358
POLYSTYRENE FOAM OPERATIONS**

SECTION 100 – GENERAL

- 101 PURPOSE:** The purpose of this rule is to limit the emissions of volatile organic compounds (VOCs) from the manufacturing of expanded-polystyrene products.
- 102 APPLICABILITY:** This rule applies to any facility that expands, ages, or molds expandable polystyrene (EPS).

SECTION 200 – DEFINITIONS: See Rule 100 (General Provisions And Definitions) of these rules for definitions of terms that are used but not specifically defined in this rule. For the purpose of this rule, the following definitions shall apply:

- 201 BEAD-LOT AND BEAD-LOT IDENTIFIER** – A specific selection of a specific quantity of expandable polystyrene material, all portions of which typically share similar properties. This selected material has been tested in accordance with standard quality-control procedures and is traceable to the time and date on which it was packaged. Traceability is enabled by a bead lot identifier or lot number, which is a unique numeric (or alphanumeric) string that is permanently coupled with the selected material. The lot number always appears on one or more formal transfer/receipt documents retained by both the seller and the buyer and identifies the material's plant of manufacture, as well as the date that it was packaged.
- 202 BLOCK (EPS FOAM BLOCK)** – A block-shaped solid made of EPS foam that was molded as a unit. Typically, a block's depth and width each exceed 23 inches (0.6 m) and a length exceeding 95 inches (2.4 m).
- 203 BLOWING AGENT** – Any substance that, alone or in conjunction with other substances, is capable of producing a cellular (foam) structure in a polymeric material by inflation.
- 204 CUP MOLDING** – The process of making cups, bowls, and similar containers by molding expanded polystyrene globules (prepuff).
- 205 DAY** - Any 24-hour period beginning at 12:00 am - midnight.
- 206 EMISSION CONTROL SYSTEM (ECS)** – A system for reducing emissions of volatile organic compounds, consisting of a capture system (e.g., enclosures, hoods, and ductwork) and control device(s). An ECS may also include gas conditioning equipment such as condensers or prefilters.

- 207 EPS BEADS (EXPANDABLE POLYSTYRENE BEADS)** – Polystyrene beads, particles, or granules, usually less than one-twelfth inch in diameter, that are formulated with a blowing agent (typically 3.5% to 7% of bead weight). When subjected to prescribed heating in an expansion system, the beads puff up, expanding many times their original volume into low density foam globules (called “prepuff” or “puff”) from which a variety of EPS foam products are molded.
- 208 EPS FOAM (EXPANDED POLYSTYRENE FOAM)** – A lightweight, naturally white, foam material, made of polystyrene, from which a variety of common items are made, such as ice-chests, insulation board, protective packaging, and single-use cups.
- 209 LOOSE FILL** – Small, expanded polystyrene forms produced in a variety of shapes that are used as packing material or as stuffing in furnishings. These foam products typically have a density below 6/10 of a pound per cubic foot (pcf).
- 210 NONPRECURSOR ORGANIC COMPOUND** – Any of the organic compounds that have been designated by the EPA as “exempt” (having negligible photochemical reactivity). A listing of the compounds is found in Rule 100 of these rules and regulations.
- 211 POLYSTYRENE** – Any grade, class, or type of thermoplastic polymer, alloy, or blend that is composed of at least 80% polymerized styrene by weight.
- 212 PREPUFF OR PUFF** – Expanded polystyrene globules, prior to molding, formed from EPS beads/granules that have been processed in an expander. No grind/regrind material (i.e., expanded EPS that has been through a grinder) or material within a grinding system is considered to be prepuff.
- 213 SHAPE** – An object made out of EPS that has been molded into a shape other than that of a block, cup, or bowl.
- 214 SPECIALTY BLOCK PRODUCTS** – For the purposes of this rule, a specialty block product is an EPS block or block-derivative (e.g., board, architectural form, etc.) that meets either of the following criteria:
- 214.1** Has a density of 2.0 pounds per cubic foot or greater, as determined by ASTM Method C303; or
- 214.2** Has a density less than 0.8 pounds per cubic foot as determined by ASTM Method C303.
- 215 VOLATILE ORGANIC COMPOUND (VOC)** – Any organic compound that participates in photochemical reactions, except nonprecursor organic compounds.
- 216 VOC CONTENT OF RAW EPS** – For the purposes of this rule, there are 3 different expressions for stating the VOC content of raw EPS beads/granules. Each of these expressions must be made in terms of either the number of

pounds of VOC per 100 pounds of beads or the percentage of overall weight (including the VOC weight) that the incorporated VOC constitutes. The percent value shall be expressed with a precision of no less than the nearest tenth of one percent, which is equivalent to expressing the same number value in pounds VOC per 100 lbs. beads, to the nearest tenth of a pound. The acceptable expressions are:

216.1 Manufacturer-Certified Bead-Lot (MCBL) VOC-Content – A document such as a standard Certificate Of Analysis that numerically presents an EPS bead-lot's VOC content and must contain all of the following elements:

- a. The VOC content printed or written on a paper document by the bead manufacturer, after the manufacturer has had the bead-lot tested to determine the lot's percent VOC, before shipping from the manufacturer; and
- b. The manufacturer's name and the bead-lot, identified on the paper document with the appropriate bead-lot identifier; and
- c. The signature of an officer of the manufacturing facility or the signature of an officer's designee, previously designated in writing by such an officer.

216.2 Post-Manufacture Laboratory-Tested (PMLT) VOC-Content: The results of a laboratory test determining the VOC content of a representative sampling of an intermediate or finished expanded polystyrene-product, or such a test of raw beads any time after their MCBL VOC content has been assigned.

216.3 ISO-Certified Maximum Bead-Model (IMBM) VOC-Content: A numerical value that represents the upper limit of a particular bead-model's VOC-content, which has been:

- a. Initially stipulated by the bead-model's manufacturer in a document that gives the bead-model's unique identifier, and
- b. Subsequently certified for accuracy by the International Standards Organization (ISO).

SECTION 300 – STANDARDS:

301 BLOCK MAKERS: An owner and/or operator of an EPS block-making facility shall comply with Section 301.1 and, if applicable, Section 301.2 of this rule.

301.1 Limit the sum of both the VOC that escaped to atmosphere and the residual VOC in the resulting blocks at the time they are released from

the molding machine to not more than 3.0 pounds for every 100 pounds of raw beads processed.

301.2 Specialty Products Alternative Operating Scenario: When producing specialty block-products solely from raw EPS beads that exceed a VOC-content of 5.5 percent by weight, an owner and/or operator may choose the standard in Section 301.2(a) by which to comply with this rule, but only if the requirements in Sections 301.2(b) and 301.2(c) are met.

- a. Limit the sum of both the VOC that escaped to atmosphere and the residual VOC in the resulting blocks at the time they are released from the molding machine to not more than 3.9 pounds for every 100 pounds of raw beads processed (3.9 lbs/100#), and
- b. Taking into account the total weight of all beads processed each year, limit the portion of that weight that is processed under the 3.9 lbs/100# standard to the percent allowed each year by Table I.

TABLE I

ANNUAL PERCENTAGE LIMITS FOR SPECIALTY PRODUCTS MADE UNDER THE SECTION 301.2(a) STANDARD

Column A	Column B
Calendar Year Of Column B Limit	Maximum Percent Of All Raw-Beads Processed Each Year That Are Allowed To Be Processed Under The 3.9 Lb/100# Standard For Specialty Products Only
2006	10.0
2007	9.0
2008	8.0
2009	7.0
2010	6.0
2011 and continuing	5.0

- c. The proportion of annual raw-material throughput that is produced under the Section 301.2(a) standard shall be calculated and recorded according to Section 502.1(d).

302 SHAPE MAKERS: An owner and/or operator of an EPS shape-making facility shall limit the sum of the VOC that escaped to atmosphere and the residual VOC in the resulting shapes to 2.7 pounds for every 100 pounds of raw beads processed.

- 303 CUP MAKERS:** An owner and/or operator of an EPS cup-making facility shall limit the sum of the VOC that escaped to atmosphere and the residual VOC in the resulting cups to 3.2 pounds for every 100 pounds of raw beads processed.
- 304 LOOSE FILL MAKERS:** An owner and/or operator of a facility that makes expanded polystyrene loose fill shall limit the sum of both the VOC that escaped to atmosphere plus the residual VOC in the finished loose fill (measured right after the final curing process) to not more than 2.4 pounds for every 100 pounds of raw EPS materials processed into finished loose fill.
- 305 PERFORMANCE OF ECS CONTROLLING VOC EMISSIONS:** If an ECS is required by this rule, comply with Sections 305.1, 305.2, and 305.3 of this rule.
- 305.1** The control device (abatement subsystem) of such ECS shall comply with either Section 305.1(a) or Section 305.1(b) of this rule.
- a.** Reduce the weight of VOC-as-carbon that enters the control device by at least 94%; or
 - b.** Maintain an hourly average outlet concentration of VOC below 20 milligrams per dry standard cubic meter. Express mass loading of VOC as milligrams of non-methane organic carbon.
- 305.2** Each ECS that is operated in order to comply with this rule shall be equipped with monitoring devices capable of demonstrating that the ECS is operating in a manner that assures compliance with this rule. The monitoring devices shall be installed, calibrated, maintained, and operated according to their manufacturers' instructions and the O&M Plan. Typically, such devices provide temperature, pressure, flow-rate, or other indicator(s) of proper ECS function (such as a continuous temperature recorder that monitors an oxidizer's combustion chamber or a condenser's outlet duct, or a pressure recorder that monitors the integrity of a permanent total-enclosure, etc.).
- 305.3** Records shall be kept according to Section 502.3 of this rule.
- 306 ECS OPERATION AND MAINTENANCE (O&M) PLANS:**
- 306.1** An owner and/or operator shall provide, implement, and maintain an O&M Plan for each ECS required by this rule. The O&M Plan shall include the monitoring device(s) associated with the ECS.
- 306.2** The owner and/or operator shall submit to the Control Officer for approval the O&M Plan of each ECS, with its associated monitoring device(s), that is used according to Sections 301.1, 301.2, 302, 303, or 304 of this rule. Also include in such O&M Plans:

- a. Procedures for collecting and recording required data and other information in a form approved by the Control Officer, which shall include data collected through the O&M Plan and through the monitoring of key system operating parameters; and
- b. Procedures and schedules for preventive and corrective maintenance performed for the purpose of maintaining the emission control system in proper operating condition.

306.3 An owner and/or operator of an EPS facility must comply with all O&M Plans that the owner and/or operator has submitted for approval but which have not yet been approved, unless notified otherwise by the Control Officer in writing.

307 VOC CONTAINMENT, IDENTIFICATION, AND DISPOSAL:

307.1 Contain VOC-Emitting Material:

- a. When they are not in use, store all fresh and used non-EPS VOC-containing material in closed, leak-free containers that are labeled according to Section 307.4. Such materials include but are not limited to cleaning solvents, inks, coatings, thinners, and their residues including residues on rags; and
- b. Store raw EPS beads in closed, leak-free, labeled containers when not in use.

307.2 Materials addressed in Section 307.1 of this rule may be placed in an enclosure ducted solely to an ECS that is approved by the Control Officer, instead of in closed containers.

307.3 The owner and/or operator must implement procedures to minimize spills of VOC-containing materials described in Section 307.1(a) of this rule, during their handling and transfer to or from containers, vats, enclosed systems, waste receptacles, and other equipment, whether the material is fresh, used, or waste.

307.4 Identification And Labeling:

- a. Containers used for initial, intermediate, or final storage of VOC-containing materials addressed in Section 307.1 of this rule shall be clearly labeled with their contents.
- b. Content-labeling done according to the requirements of federal hazardous waste (RCRA) or occupational safety (OSHA) statutes and codes meets the requirements in Section 307.4(a) of this rule.

308 EXEMPTION:

308.1 Exemption From Section 301.1 Through Section 306.3: An owner and/or operator of a facility is exempt from the requirements of Section 301.1 through Section 306.3 of this rule, if the total VOC content of all raw EPS material processed by the facility is, in each calendar year, below 50 tons (100,000 lbs) and, in each calendar month, below 12,000 pounds.

308.2 Burden Of Proof: A person claiming any exemption from this rule or from a provision of this rule shall provide adequate records to verify and maintain any exemption. These may include records of raw material used, laboratory analyses, technical data sheets, and/or performance test results.

SECTION 400 - ADMINISTRATIVE REQUIREMENTS

401 COMPLIANCE SCHEDULE: A person or owner/operator of a facility that is subject to Sections 301, 302, 303, or 304 of this rule shall comply with the following increments of progress:

401.1 By July 20, 2005, the owner and/or operator shall comply with Section 502 through Section 502.2(c) of this rule;

401.2 By August 20, 2005, the owner and/or operator either must submit an application or have been issued a revised permit that addresses the installation and operation of the equipment to be used to achieve compliance with this rule; also, comply with Section 307.1 through Section 307.4 of this rule;

401.3 By April 20, 2006, the owner and/or operator must complete the installation of all equipment required to meet the provisions of this rule and also comply with all O&M Plan requirements in Section 306 and Section 502.3 of this rule; and

401.4 By October 20, 2006, the owner and/or operator must comply with the applicable standards in Sections 301, 302, 303, 304, and 305 of this rule.

SECTION 500 - MONITORING AND RECORDS

501 RECORDS:

501.1 General: Records shall be kept complete, up-to-date, and in a consistent and legible format.

501.2 Retention: Records required by this rule shall be retained for at least 5 years.

501.3 Use Of Other Records: Records that are kept by an EPS facility for other agencies or purposes may be submitted to the Control Officer to meet the record requirements of this rule, provided such records contain the necessary information according to Section 502 of this rule.

502 RECORDKEEPING SPECIFICS:

502.1 Tracking EPS Beads: Effective July 20, 2005, a person subject to this rule shall comply with the following requirements, as applicable.

- a. **Lot ID And VOC Content:** Prior to expanding any part of a bead-lot, an owner and/or operator shall obtain and retain an original or copy of the VOC-content, as defined in Section 216 of this rule, for each separate lot-number/identifier of beads received.
- b. **Total Expanded By Lot And Date:** Each day that raw EPS material is expanded in a facility's expander, an owner and/or operator shall record the amount of each bead-lot expanded and its corresponding lot number/identifier.
- c. **Block-Makers:** Each day that blocks are made, record the approximate weight of each newly molded block, measured to the nearest 2 pounds.
- d. **Specialty Products Subject To Section 301.2(a):** An EPS-block facility owner and/or operator making specialty products under Section 301.2(a) of this rule shall:
 - (1) Maintain a log indicating when the facility is operating under the specialty-products alternative operating scenario; and
 - (2) Each month calculate the percent of total EPS raw material used during the current calendar year that specialty products, made under Section 301.2(a) of this rule, constitute; enter the calculations and results in the log.

502.2 Lists Of Non-EPS VOC-Containing Materials: Non-EPS materials may include, but are not limited to, the following categories: inks, coatings, adhesives, reducers, thinners, solvents, cleaning materials, additives, spray-cans, sprayed lubricants, and any other VOC-containing materials that are not EPS.

- a. An owner and/or operator shall maintain a current list of non-EPS materials, containing VOC, used at the facility. A complete and ordered assemblage of the required data meets the requirements for a list.

- b. An owner and/or operator shall express VOC content of non-EPS material in one of the following three forms:
 - (1) Pounds VOC per gallon (or grams VOC per liter), or
 - (2) Fractional pounds of VOC per lb. material (or grams per kilogram), or
 - (3) The percent VOC by weight along with the specific gravity or density (two numbers are required for each entry).
- c. By the end of the following month, an owner and/or operator shall record the amount and type of each non-EPS material, containing VOC that was used during each month.

502.3 Records Of ECS Operation And Monitoring: On a daily basis, the owner and/or operator of a facility that operates an ECS to comply with this rule shall record key system operating parameters such as temperature, flow rate, pressure, and/or VOC-concentration, etc.

503 TEST PROCEDURES: An owner and/or operator of an EPS facility will be in violation of this rule if the VOC emissions, measured by any of the referenced test methods specified in this Section 503 of this rule and listed in Section 504 of this rule, do not comply with the applicable standards included by Section 301 through Section 305 of this rule.

503.1 Each year between June 1 and August 31, an owner and/or operator shall conduct an annual performance test on each ECS used to meet a standard in this Rule 358, using the test methods designated by Section 503.2 through Section 503.7 of this rule and incorporated by reference in Section 504 of this rule.

503.2 An owner and/or operator shall perform the measurement of airflow and gas flow into and out of the ECS by performing EPA Method 2, referenced in Section 504.1 of this rule.

503.3 An owner and/or operator shall determine the concentration of methane and ethane emissions by performing EPA Method 18, referenced in Section 504.2 of this rule or Method 25 (and its submethods) referenced in Section 504.3 of this rule.

503.4 An owner and/or operator shall determine the control efficiency of the VOC control device (abatement subsystem) of an ECS by performing EPA Method 25 (and its submethods), referenced in Section 504.3 of this rule.

503.5 An owner and/or operator shall determine the efficiency of a capture system according to both EPA Method 204 (and its submethods)

referenced in Section 504.4 of this rule and the EPA guidance document referenced in Section 504.7 of this rule.

503.6 An owner and/or operator shall determine the concentration of total volatile organic carbon content in polymeric materials by performing Bay Area Quality Management District (BAAQMD) Method 45 as referenced in Section 504.5 of this rule or by performing South Coast Air Quality Management District (SCAQMD) Method 306-91, 1993 revision, as referenced in Section 504.6 of this rule.

503.7 Determination Of ECS Effectiveness: ECS effectiveness shall be determined from the results of a testing protocol based on mass balance, calculated according to the following formulas:

$$\% \text{ CAPTURE} = \frac{VOC_{ECS}}{VOC_I - VOC_P} \times 100$$

$$\% \text{ CONTROL} = \frac{VOC_{ECS} - VOC_{St}}{VOC_{ECS}} \times 100$$

$$\% \text{ EMITTED} = \frac{VOC_I + VOC_{St} - VOC_P - VOC_{ECS}}{VOC_I - VOC_P} \times 100$$

$$\% \text{ OVERALL (Capture + Control)} = \frac{VOC_{ECS}}{VOC_I - VOC_P} \times \frac{VOC_{ECS} - VOC_{St}}{VOC_{ECS}} \times 100$$

Where:

VOC_I is the VOC input in the form of the VOC content of a weighed mass of raw beads.

VOC_P is the VOC content of the products made from the weighed raw beads.

VOC_{ECS} is the VOC measured in the air entering the ECS.

VOC_{St} is the VOC remaining in the gas stream(s) emerging from the ECS during production.

503.8 Determination Of Product Density: The ASTM Method C303-02 referenced in Section 504.8 of this rule shall be used to determine the density of EPS foam blocks and block-derivatives.

503.9 Conforming Testing To Desired Production Characteristics: The owner and/or operator of an EPS facility must, through performance testing, demonstrate compliance with each alternative operating scenario chosen.

504 TEST METHODS ADOPTED BY REFERENCE: The EPA test methods as they exist in the Code of Federal Regulations (C.F.R.) on July 1, 2004, are adopted by reference. These adoptions by reference include no future editions or amendments. Copies of test methods referenced in this Section are available at the Maricopa County Environmental Services Department, 1001 North Central Avenue, Phoenix, AZ, 85004-1942. The other test methods from Bay Area Air Quality Management District and South Coast Air Quality Management District listed herein are also adopted by reference, each having paired with it a specific date that identifies the particular version/revision of the method that is adopted by reference.

504.1 EPA Reference Method 2 ("Determination Of Stack Gas Velocity And Volumetric Flow Rate"), 2a ("Direct Measurement Of Gas Volume Through Pipes And Small Ducts"), 2c ("Determination Of Stack Gas Velocity And Volumetric Flow Rate In Small Stacks Or Ducts"), and 2d ("Measurement Of Gas Volumetric Flow Rates In Small Pipes And Ducts"), (40 C.F.R. 60, Appendix A).

504.2 EPA Reference Method 18 ("Measurement Of Gaseous Organic Compound Emissions By Gas Chromatography"), (40 C.F.R. 60, Appendix A).

504.3 EPA Reference Method 25 ("Determination Of Total Gaseous Nonmethane Organic Emissions As Carbon"), (40 C.F.R. 60, Appendix A).

504.4 EPA Reference Method 204 ("Criteria for Determining Capture Efficiency"), 204A, 204B, 204C, 204D ("Volatile Organic Compounds Emissions In Uncaptured Stream From Temporary Total Enclosure"), 204E ("Volatile Organic Compounds Emissions In Un-Captured Stream From Building Enclosure"), and 204 F ("Volatile Organic Compounds Content In Liquid Input Stream {Distillation Approach}") (40 C.F.R. 51, Appendix M).

504.5 BAAQMD Method 45 ("Determination Of Butanes And Pentanes In Polymeric Materials"), (BAAQMD Manual Of Procedures, Volume III, January 19, 2000).

504.6 SCAQMD Method 306-91, February 1993 revision ("Analysis Of Pentanes In Expandable Styrene Polymers"), Applied Science & Technology Division – Laboratory Services Branch.

504.7 EPA Guidance Document, "Guidelines For Determining Capture Efficiency", January 9, 1995.

504.8 American Society Of Testing Materials, ASTM Method C303-02 (Standard Test Method For Dimensions And Density Of Preformed Block And Broad-Type Thermal Insulation), 2002.